

Abstract Submitted
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InMnAs based bipolar junction transistor NIKHIL RANGARAJU, JOHN PETERS, BRUCE WESSELS, Department of Materials Science and Engineering, Northwestern University — InMnAs is a p-type dilute magnetic semiconductor. The characteristics of InMnAs/n-InAs/p-InAs bipolar junction transistors at temperatures from 5 to 300 K and magnetic fields up to 9T were investigated. Amplification as high as 30 is observed in these devices at room temperature and zero magnetic field. The amplification of the transistor is observed to be proportional to $I_C^{(1-1/\eta)}$ where I_C is the collector current and η is the ideality factor of the transistor. The observed amplification behavior of the transistor can be attributed to several factors such as base width modulation, the effect of generation-recombination current, resistance of the base, and geometry of the device. The role of spin on the magneto-transport properties of these devices was investigated and the resulting differences in the behavior of the transistor when the magnetic InMnAs layer acts either as an emitter or a collector was examined. A change in amplification with magnetic field was observed that makes these devices potential candidates for new computing architectures.

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